

Partial Groups Problem Situations - Multiplication

1. Solve each problem by direct modeling. Describe your reasoning.

- a. A punch recipe calls for 2 cups of sugar. How much sugar do I need to triple the batch?
- b. A punch recipe calls for $\frac{1}{2}$ cup of sugar. How much sugar do I need to triple the batch?
- c. A punch recipe calls for 2 cups of sugar. How much sugar do I need to make $\frac{3}{4}$ of a batch?
- d. A punch recipe calls for $\frac{1}{2}$ cup of sugar. How much sugar do I need to make $\frac{3}{4}$ of a batch?

2. Complete the following table for each word problem.

Word Problem	Number of Groups	Amount per Group	Total	Possible Equation	Problem Type
A punch recipe calls for 2 cups of sugar. How much sugar do I need to triple the batch?					
A punch recipe calls for $\frac{1}{2}$ cup of sugar. How much sugar do I need to triple the batch?					
A punch recipe calls for 2 cups of sugar. How much sugar do I need to make $\frac{3}{4}$ of a batch?					
A punch recipe calls for $\frac{1}{2}$ cup of sugar. How much sugar do I need to make $\frac{3}{4}$ of a batch?					

Adapted from: Empson, S. B. and Levi, L. (2011). *Extending Children's Mathematics: Fractions & Decimals, Innovations in Cognitively Guided Instruction*. Portsmouth, NH: Heinemann.

Note: The last two problems are Partial Groups problems. A Partial Groups problem is one in which the number of groups is not a whole number. A Multiple Groups problem is one in which there is a whole number of groups and a fractional amount in each group where the fraction is not equal to a whole number. An Equal Sharing problem is one type of Multiple Group problem.

3. Solve the last two problems again using relational thinking. Write an equation to make your relational thinking explicit.

a. A punch recipe calls for 2 cups of sugar. How much sugar do I need to make $\frac{3}{4}$ of a batch?

b. A punch recipe calls for $\frac{1}{2}$ cup of sugar. How much sugar do I need to make $\frac{3}{4}$ of a batch?

4. How might you use the last problem to make sense of the traditional algorithm for multiplying fractions?